INFORMED SOURCES, SAMPLE ONLY

Using apps and digital devices to enhance learning

When it comes to mobile devices in schools, the media delight in extremes: parents and teachers are alternately warned that smartphones will scramble children's brains, and assured digital technologies will rear a generation of innovators.

Neither, of course, is entirely true. While shifting technologies bring important changes in all areas of life, the effects of digital technologies on education depend very much on the app or device in question, and how it is used by students, parents, and teachers.

Garry Falloon is Professor of Digital Learning at Macquarie University, and has completed numerous studies on the use of digital devices in enhancing children's learning and developing their thinking skills – several of which closely tracked the way students used apps to map the thinking skills they were using.

Used well, says Professor Falloon, mobile devices and apps can help children develop their reflective, critical, and analytical thinking. One useful way of using them, he says, is as "scaffolds" for student problem-solving: supports that provide guidance to students as needed, while still challenging them to think for themselves.

In a recent study, he looked at a series of apps used to guide students through science experiments. Each app had an optional quiz and a range of experiments with "a short introduction, an equipment list, bulleted instructions and an explanation of the scientific phenomenon being investigated. There is also an optional video (no audio) showing numbered stages involved in setting up and completing each experiment."

The video proved especially effective: students regularly referred back to it for guidance, to check their own work against it, and to figure out the causes of any unexpected results in their experiment. He said it was effective partly because it had no audio instructions and didn't spoon feed students, instead stimulating "analytical discussions and thinking".

Few students, however, made use of the text explaining the concepts behind the experiment. Fortunately, because close tabs were kept on the way students were using the app, teachers could step in to explain this aspect. With that in mind, Professor Falloon highlighted that learning apps need to be tailored to different groups of students, and cannot replace good teaching.

"Teachers must monitor their students' conceptual learning with apps very closely, and be prepared to augment their use with additional teaching interventions," said Professor Falloon.

"If teachers want to extract the maximum learning benefit from using apps of this type and design, they should pay careful attention to how they are integrated into larger topics or units, rather than expect them to stand alone or function in isolation as science learning experiences."

Nonetheless, Professor Falloon said this series of apps was "very effective for helping students organise, plan and execute their experiments with minimal teacher support or direct intervention." Their minimalist and uncluttered design, he said, contributed to making them easy for students to navigate.

Apps can also be a great way to engage students. But Professor Falloon cautions that teachers and parents should be careful not to confuse app engagement with learning. When a student is

absorbed in a learning app, it doesn't always mean they're engrossed in new ideas, as they might just be following instructions without giving things much deeper thought.

Professor Falloon gives the following tips for using apps to enhance learning:

For teachers:

- Apps are a means to an end and not an end in themselves. Ensure they're aligned with broader learning and teaching goals.
- Focus on the development of higher order thinking, analysis and evaluation skills.
- Encourage students to use technology to demonstrate, share and gain feedback on knowledge created from learning experiences, in and beyond the traditional classroom.
- Use apps in open-ended learning tasks where students need to collaborate and research information responding to inquiry or problem-based tasks.
- Younger students can benefit from using devices in pairs for learning tasks. Interactions between the students can help them build their knowledge.
- The 'easy edit' capability of digital devices supports students' editing efforts, and can encourage them to improve their work, given appropriate and timely feedback.
- Don't confuse engagement with learning.
- Many 'learning game' apps are poorly designed and largely ineffective. Learning requires formative feedback which these do not provide. 'Token' rewards built into many apps are ineffective for promoting learning.

For parents

- Engage with your child when they are using devices, especially younger children.
- If using digital books, read with them and help them understand and use any interactive features as learning resources, not entertainments.
- The interactions and discussions you have with your child when sharing and using digital learning materials will probably be of greater learning value than the material itself.

Both parents and teachers, says Professor Falloon, need to be discerning about the selection of apps. "Look critically at the game-learning content balance, and the extent to which the app provides options to tailor its content and delivery to students of different ability levels," he says.

"Generally, apps that allow students to author and create and share content are more valuable than 'learning games'."

If you'd like more information on using apps and devices to enhance learning, you can find it here:

Garry Falloon. (2017). 'Mobile Devices and Apps as Scaffolds to Science Learning in the Primary Classroom', *Journal of Science Education and Technology*.

Garry Falloon. (2017). 'iPads, apps and student thinking skill development'. In *Apps, technology and younger learners: International evidence for teaching*.

Garry Falloon. (2015) 'Digital learning objects and the development of students' thinking skills'. In *Digital smarts: enhancing learning and teaching*. (Open Access)